



## Academic work-integrated learning (WIL): Reengaging teaching-focused academics with industry

Michael B. Whelan

[michael.whelan@scu.edu.au](mailto:michael.whelan@scu.edu.au)

School of Environment, Science and Engineering, Southern Cross University, Lismore, Australia

### Abstract

There has been an increase in the number of teaching-focused academics at Australian universities over recent years. However, research-focused and teaching-research academics have an advantage over teaching-focused academics in terms of promotion, forced redundancies and tenure. While evidence of research success is measured by volume (number of publications and research income), evidence of teaching scholarship is less quantifiable. The value of industry-university collaboration has been reported widely. However, the focus is on the value of the knowledge transfer of university research to industry and collaborative industry-university research. Academics collaborating with industry partners on research projects are able to experience current industry practice firsthand, raising the question: How do teaching-focused academics remain engaged with industry? The benefits of work-integrated learning (WIL) to hosts, students and universities are well documented. This paper poses the question: Is a WIL placement a way to reengage teaching-focused academics with industry?, and introduces the concept of 'Academic WIL' where academics complete an internship placement with an industry partner. The impact on graduate employability is discussed and a methodology for a teaching-focused academic to use their Academic WIL experience as evidence of their achievements in the scholarship of teaching is presented.

Keywords: teaching-focused academic, work-integrated learning, industry engagement

### Context

For teaching-focused academics, often considered to be 'lesser' academics (*Academicus minor*), maintaining industry connections is vital to the renewal and relevance of their curriculum (Dyer et al., 2016; Bennett, Roberts, & Ananthram, 2017). The focus of this paper is on how academics might use industry engagement to renew and refresh their understanding of current practice in order to sustain a relevant curriculum. A case study approach is used to demonstrate how an academic in the geographic information systems and remote sensing field who, having not taught in the field for 10 years due to administrative responsibilities (course coordination, course development and managing academic workload), prepared to once again take up teaching in the discipline. During the 10 year hiatus the teaching responsibilities included work-integrated learning (WIL).

The experience in WIL provided some guidance in addressing the dilemma of designing a contemporary curriculum to prepare students to work in the field given the lack of recent

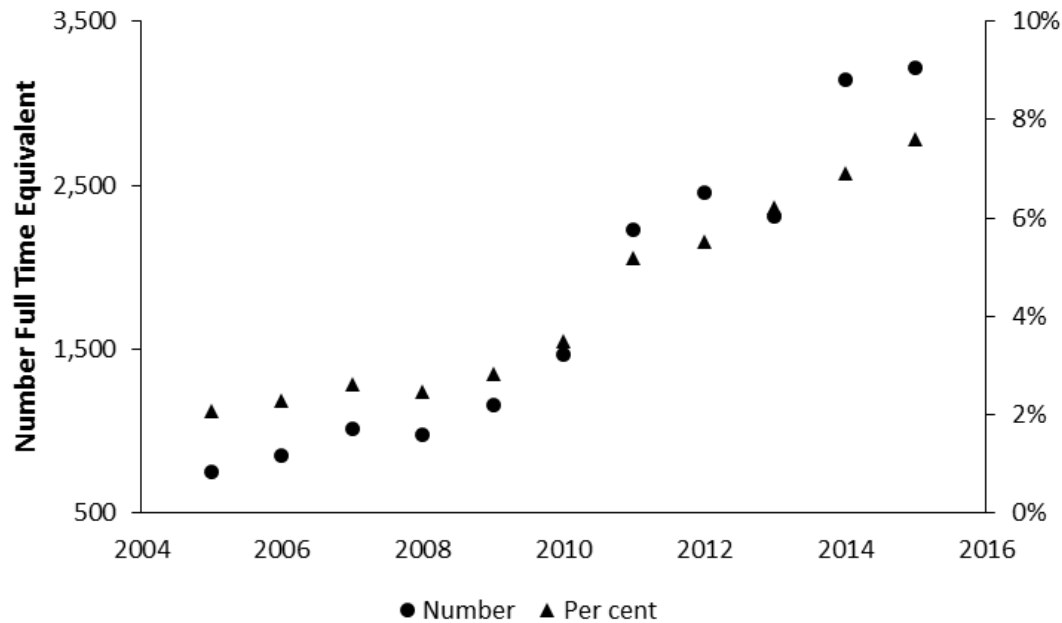
contact with the industry by the academic. Firstly, some important connections with industry partners who supervised students on their eight-week placement had been made. Secondly, the reflective journals of students on placements confirmed that they appreciated the value of their experiential learning and this prompted the questions: Could short internships provide teaching-focused academics with the opportunity to renew their curriculum to ensure it aligned with current industry practice? Is a WIL placement a way for a teaching-focused academic to reengage with industry?

## **Review of literature**

In Australia, academics are classified as teaching-only, research-only and teaching-research academics (Department of Education and Training, 2016). Probert (2013) used the term teaching-focused academic to include academics who focus on the scholarship of teaching. For the purposes of this article the term teaching-focused academic has been used to include teaching-only academics, teaching-focused academics and teaching-intensive academics (Probert, 2013). In Australia academics have 5 levels (A to E); Level A (Associate Lecturer), Level B (Lecturer), Level C (Senior Lecturer), Level D (Associate Professor) and Level E (Professor) (Australian Industrial Relations Commission, 2007; Chalmers et al., 2014; Department of Education and Training, 2016).

### *The rise of teaching-focused academics*

The number of teaching-focused academics in Australia has increased from 755 in 2005 to 3212 in 2015, currently representing 7.2 per cent of academic positions (Department of Education and Training, 2016). The increase in the number and percentage of teaching-only academics is illustrated in Figure 1. Probert (2013) quoted a slightly higher proportion, approximately 10 per cent, of academic positions were teaching-focused. The difference could be attributed to Probert's (2013) broader definition of teaching-focused academic. If the trend continues in Australia (Figure 1) 20 per cent of tenured academics could be teaching-focused by 2030. The number of teaching-focused academics is also increasing in the UK (Locke, 2014) and Canada (Sanders, 2011). In Australia, the rise of the teaching-focused academic is credited to universities seeking to increase their Excellence in Research (ERA) rankings. Poor performing teaching-research academics tend to become teaching-focused academics to maintain ERA rankings (Bennett, Roberts, Ananthram, & Broughton, 2017; Probert, 2013). By reducing the number of academics included in the census of 'research active academics' the publication rate and research income per academic can be increased with the same output (Probert, 2013). Norton (2013) proposed doubling the number of teaching-focused academics (from 2500 to 5000) in a handful of universities to act as a circuit-breaker to the institutional focus on research.



**Figure 1: Number (Full-time and Fractional Full-time Appointments) and Percentage of Teaching-only Academics in Australian Universities (Department of Education and Training, 2016).**

*The teaching-focused academics (Academicus minor)*

There is a perception that teaching-focused academics are 'lesser academics' (Bennett et al., 2017; Bexley, James, & Arkoudis, 2011; Chalmers, 2011; Israel, 2011; Locke, 2014; Neumann, 1992; Norton, 2013; Nyamapfene, 2014; Probert, 2013). Nyamapfene (2014) reported that UK teaching-focused academics considered that they were 'second class'.

There is strong evidence to affirm the perception that teaching-focused academics are 'lesser academics' in Australia. Most (64%) teaching-research academics prefer the research aspect of their job and 35 per cent prefer teaching (Bexley et al., 2011). On the other hand, in the US 74 per cent of teaching-only academics prefer teaching (Bexley et al., 2011). Moreover, while higher degree students in Australia are very interested in becoming academics, only 37 per cent see teaching as a 'very attractive' aspect of the career (Edwards, Bexley, & Richardson, 2011). Edwards et al. (2011) suggested that it was their supervisors who influenced higher degree students' attitudes to teaching.

University recruitment is focused more on research performance than teaching performance/skills (Norton, 2013), leading to teaching-research academics who would prefer to be 'research-teaching' academics. Institutions also focus on research to the detriment of teaching, as illustrated in the following quote.

*Last year...a popular instructor with the School of Business [at Carleton University, Canada] didn't have his term contract as a full-time lecturer renewed. The university argued that the business school's accreditation, funding and reputation hinges on its research capacity, and that when funding for a full-time tenure track position became available, it had to concentrate on hiring a professor with a track record in research as well as teaching. Despite his [the instructor's] teaching talents, [he] doesn't have a PhD. Hundreds of students signed a petition to have him reinstated. He accepted a contract to teach two courses this academic year (Farr, 2008).*

A different culture exists in the US. Almost all (97%) academics consider teaching to be 'personally essential or very important' (Hurtado, Eagan, Pryor, Whang, & Tran, 2012). There is also a different system in higher degree training whereby students are actively involved in teaching as part of their qualification (Edwards et al., 2011). The perception of the value of teaching in the US may account for the high job satisfaction amongst academics (Bentley, Coates, Dobson, Goedegebuure, & Meek, 2013; Hurtado et al., 2012) and a more positive outlook of junior academics in the US (Bentley et al., 2013).

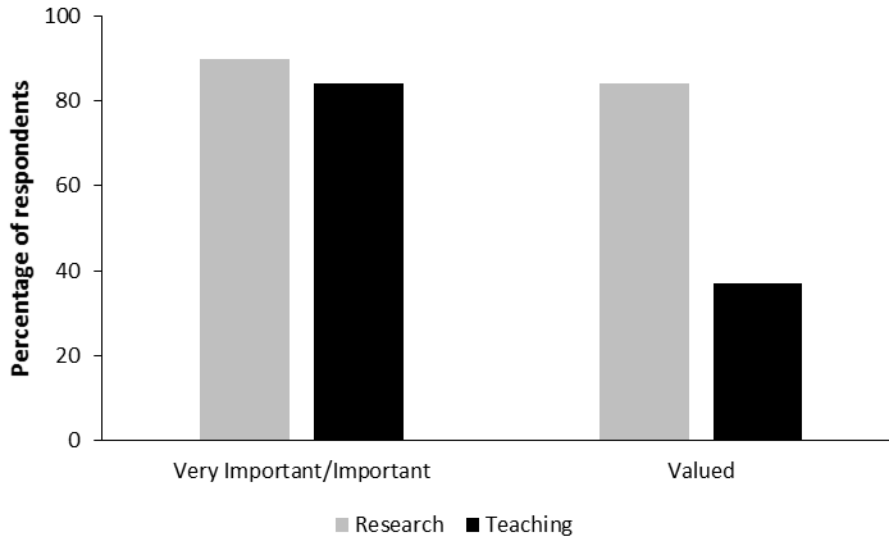
### *The vulnerability of Academicus minor*

In Australia, permanent research-only academics outnumber teaching-only academics four to one (Department of Education and Training, 2016; Norton, 2013). Promotion of academic staff is seen to rely on research performance rather than teaching performance, with only 29 per cent of academics perceiving that teaching was rewarded in promotion (Norton, 2013). The data support their perception, with less than 10 per cent of teaching-only academics above senior lecturer level, while more than 30 per cent of teaching-research academics are above senior lecturer level (Norton, 2013). Even when a teaching-focused academic is recognised for teaching excellence it may not be acknowledged by their peers (Chalmers, 2011) or, indeed, they may be subject to ridicule from other academics (Israel, 2011).

Teaching-focused academics are further marginalised by casual employment (82% are casual employees) (Norton, 2013). Over the last decade there has been a significant increase in casual staff, primarily to support teaching (Coates, Dobson, Goedegebuure, & Meek, 2009; Universities Australia, 2015). When a tenured position becomes available an academic with a track record in research is often appointed rather than a teaching-focused and, most likely, casual academic (Farr, 2008). Tragically, the recent suicide of an academic, who had worked as a casual academic for 15 years, was linked to the loss of his contract (Morgan, 2016).

The vulnerability of the teaching-focused academic is further evidenced in relation to redundancies. The volume of research (number of publications and research income) is valued more than volume of teaching (Probert, 2013). An attitude of 'anyone can teach' prevails (Neumann, 1992).

Academics recognise the importance of teaching and research equally but consider research has greater value for promotion (Figure 2). Norton's (2013) recommendation to double the number of teaching-focused academics may lead to recognition of teaching performance within the institution and better defined career paths for teaching-focused academics. There have been attempts to formalise the achievements and performance of teaching-focused academics. The UK-based professional standards framework for teaching and supporting learning in higher education, for example, has developed a fellowship system whereby academics can be accredited as Associate Fellows, Fellows, Senior Fellows and Principal Fellows (Higher Education Academy, 2011). In Australia, Chalmers et al. (2014) have developed standards for teaching-focused academics that aligned with Australian academic levels (A to E). The standards are provided for seven criteria that focus on different aspects of the scholarship of teaching.



**Figure 2: Importance of Teaching and Research vs Perceived Value for Promotion Based on a Survey of Australian Academics (Probert, 2013).**

At a national level there does not appear to be any strategy to improve the recognition of teaching-focused academics. The Australian Research Council (ARC) is the body that distributes much of the Category One research funding to universities in Australia. It has been in existence since 1946 with name changes in 1965 and 1988 (Australian Research Council, 2016). In contrast, the Australian government's equivalent teaching and learning body was only founded in 2006. More tellingly, what started as the Carrick Institute in 2006, and has most recently been known as the Office of Learning and Teaching, was closed in June 2016. There is no indication if, when and how it will be replaced (Office for Learning and Teaching, 2016).

#### *The benefits of industry-university relationships*

The value of industry-university relationships with regard to research has been widely reported (e.g. Bekkers & Freitas, 2008; D'Este & Patel, 2007; Scharfetter, Rammer, Fischer, & Fröhlich, 2002). Among the Organisation for Economic Co-operation and Development (OECD) countries, Australian businesses' collaboration with higher education institutions or public research agencies is one of the lowest (Universities Australia, 2015). Stronger links between industry and universities has been identified as a mechanism of improving the employability of graduates (Business Industry and Higher Education Collaboration Council, 2007). To develop better employability skills academic staff need to have knowledge of current industry practice (Business Industry and Higher Education Collaboration Council, 2007). Recruiting academics from industry is one method to bring current industry practice into universities but it is unlikely to increase the research profile of a university (Norton, 2013).

Bekkers and Freitas (2008) identified 23 channels of knowledge transfer between industry and universities. Of the 23 channels, the majority were research-based (e.g. publications, conferences, cooperative research) and focused on the transfer of knowledge from universities to industry. Three channels were related to teaching and learning (university graduates as employees, students working as trainees and contract-based training offered by universities) and three were related to staff mobility (staff holding positions in industry and universities, flow of university staff into industry positions and temporary staff exchange). In their analysis the staff mobility channels remained together in one of six clusters but teaching and learning were distributed into other clusters (Bekkers & Freitas, 2008). Their analysis

revealed that younger respondents valued staff mobility and it was valued when breakthroughs were imminent (Bekkers & Freitas, 2008).

The teaching-research nexus, in theory, leads to better curriculum development (Norton, 2013). Academics tend to teach broadly in their discipline rather than teaching specific subjects focused on their latest research. There is a risk that a research academic may align the curriculum with their own narrow field of research (Neumann, 1992). A more recent review (Malcolm, 2014) clarifies the mechanisms of the teaching-research nexus but did not quantify the value in terms of improved curriculum or assessment.

### *Work-integrated learning (WIL)*

Work-integrated learning (WIL) has for many years been considered an authentic experience that helps develop graduates' employability skills and has great benefit to students (Patrick, Peach, & Pocknee, 2008; Smith, Ferns, & Russell, 2014). Internships are the most common form of WIL (PhillipsKPA, 2014). WIL is often a requirement for disciplines that require accreditation (e.g. health professionals, teachers and engineers). WIL provides an opportunity to measure the attainment of learning outcomes in an authentic, quantifiable way (Jackson, 2010; Whelan, 2017).

One of the goals of WIL is to deepen classroom conceptions, apply skills and make the curriculum more meaningful to students (Orrell, 2011). One way to make the curriculum more meaningful is to review the curriculum in response to feedback from industry (Patrick et al., 2008). Contributing to curriculum development has been identified by industry participating in WIL (PhillipsKPA, 2014) but curriculum development was not listed as a benefit in a scoping study (Australian Workforce and Productivity Agency, 2015).

To improve teaching methods and to develop better employability skills in graduates, academic staff need knowledge of the structure and function of the workplaces in which graduates may find themselves as well as current industry practice (Business Industry and Higher Education Collaboration Council, 2007). Teaching-research academics have the opportunity to engage with industry via their research interests (Bekkers & Freitas, 2008). However, a teaching-focused academic does not have the same opportunity (Bennett et al., 2017). Some teaching-focussed try to 'keep their hand in' with their discipline, but heavy teaching loads make it difficult to gain traction (Nyamapfene, 2014).

In some disciplines, for example nursing, industry engagement is required for accreditation. Accreditation of a nursing degree requires some of the teaching staff to be registered nurses (Australian Nursing and Midwifery Accreditation Council, 2012). To remain registered, nurses must meet the minimum requirement of recency of practice, that is, demonstrate one or more of the following; 450 hours practice within the past five years, completion of approved assessment and supervised practice (Nursing and Midwifery Board of Australia, 2016). As a consequence, nursing academics stay engaged with current industry practice.

There exists an inherent conflict between teaching and research because of the institutional system that rewards research rather than teaching (Chalmers, 2011; Neumann, 1996). Neumann (1992), after interviewing heads of department and university executive revealed, what could be described as, a cultural bias against teaching-focused academics in universities. Neumann (1992) discovered a culture that valued knowledge of the discipline more than teaching skills. The quotes below (from senior academics participating in Neumann's study) illustrate a culture that was biased against teaching-focused academics.

*...academics involved in research were described as being: alert, enthusiastic, excited, keen, curious, fresh, and more alive (p. 164).*

*The teaching of those academics not involved in research was described as: repetitive, dull, unstimulating, unexciting, dry, sterile and stagnant (p. 164).*

This cultural bias against teaching-focused academics may no longer be expressed in such forthright language but the reports by Bexley et al. (2011), Norton (2013) and Probert (2013) and statistics regarding casualisation of academics, poor promotion prospects, redundancy priorities (Department of Education and Training, 2016; Norton, 2013; Probert, 2013; Universities Australia, 2015) and the attitude to teaching awards (Chalmers, 2011; Israel, 2011), indicate that, in fact, very little has changed. In addition, a recent report by Bennett et al. (2017) revealed that teaching-focused academics considered the university culture was biased in favour of research academics.

### *The Academic WIL concept*

In placement-based WIL the student enters the workplace as an employee and is supervised by a host-supervisor. Their performance is assessed by their host-supervisor and the academic. In Academic WIL the academic will enter the workplace as an employee and will be supervised by a host-supervisor. The academic's performance will be assessed by the host-supervisor and can be incorporated into their teaching portfolio. The industry placement should lead to improvements in assessment (i.e. greater authenticity) and the curriculum (better alignment with current industry practice). The experience in industry should invigorate the academic and lead to greater enthusiasm in the classroom. Better assessment, more relevant curriculum and more enthusiasm will lead to better student evaluations. Thus, in Academic WIL the academic will be assessed by the host and also, indirectly, by the students.

Academic WIL will provide teaching-focused academics the opportunity to test the curriculum in the workplace. Academics will be able to provide evidence to substantiate curriculum changes to meet industry needs. Industry will have closer relationships with academics responsible for curriculum development. Teaching-focused academics can experience firsthand the current industry practice and use it when they return to the classroom. By going on placement, say biennially, staff will maintain their currency within their professions.

Academic WIL has the potential to reduce the vulnerability of teaching-focused academics. Academics should have well-developed skills (e.g. managing students, managing teaching teams, communicating with a diverse spectrum of stakeholders, evaluating reports and presenting to large groups) that employers value (Business Industry and Higher Education Collaboration Council, 2007; Deloitte Access Economics Pty Ltd & Office of the Chief Scientist, 2014; Jackson, 2010; Knight & Yorke, 2003). Teaching-focused academics engaged in Academic WIL will have the opportunity to have their performance evaluated by professionals external to the university system. Evaluations from placement host-supervisors will provide them with evidence of their expert performance (Department of Industry Innovation Climate Change Science Research and Tertiary Education & Department of Education Employment and Workplace Relations, 2013). These evaluations are similar to the way in which researchers have their work evaluated by peer review.

Academic WIL has the potential to change the culture of bias against teaching-focused academics identified by Neumann (1992) and Bennett et al. (2017). Academics returning from a placement would have firsthand knowledge of the environment a new graduate would be experiencing. This knowledge will be valuable to the university and students. They will know how to assess their students more authentically and will be able to align the curriculum with industry needs. The dull teaching-focused academic (Neumann, 1992) will become more enthusiastic, excited, keen, curious, fresh and alive after returning from an Academic WIL placement.

Academic WIL has the potential to overcome the perception that teaching-focused academics are 'second-class'. By engaging in Academic WIL, teaching-focused academics are more likely to 'produce' work-ready graduates, something valued by industry, and likely to result in closer relationships between the university and industry. However, the real value of the teaching-industry nexus must be recognised by the executive of the university if its full potential is to be realised, such as leading to collaborative research projects.

#### *Academic WIL and teaching-focused academic promotion*

Some Australian universities have embraced Boyer's (1990) model of scholarship (discovery, integration, application and teaching) (Probert, 2013). Boyer (1990) argued that a faculty should be a mosaic of talent and it was difficult to maintain the mosaic if only one talent (research) was rewarded. Academic WIL fits well within Boyer's scholarship of application, scholarship of integration and scholarship of teaching. Academic WIL will establish a teaching-industry nexus, i.e. scholarship of engagement (Boyer, 1996). Academic WIL will add another dimension (i.e. practitioner) to the academic's portfolio.

It is possible to build a case for promotion using Boyer's model (Boyd, 2013; Vardi & Quin, 2011) and there has been some effort to formalise the performance of the expectations of teaching-focused academics (Chalmers et al., 2014). However, confusion surrounding the role of teaching-focused academics makes it difficult to define a pathway (Bennett et al., 2017). Rubrics have been developed to provide greater transparency of standards in the scholarship of teaching. Rigorous assessment methods would need to be developed and promotion panels for teaching-focused academics could include experienced practitioners rather than, as they tend to be now, dominated by high volume researchers. Academic WIL would assist in providing evidence such as that suggested below each of the following criteria and standards (in italics) as described in Level D (Associate Professor) by Chalmers et al. (2014):

#### *Criterion 1: Design and planning of learning activities (p. 44)*

- *External expert peer review of unit/course materials /curriculum/initiative:*

The academic will need to provide evidence from their host-supervisor that the curriculum has been reviewed. It may require the development of a process to review curriculum based on feedback while on placement (e.g. interview or survey of colleagues in the host organisation).

#### *Criterion 2: Teaching and supporting student learning (p. 46)*

- *Evidence of systematic and integrated development of teaching practices informed by scholarship/research:*

The academic will need to provide an argument that the Academic WIL experience has been integrated so as to result in better teaching practices. Evidence of changes and the positive outcomes from the changes will be required.

#### *Criterion 3: Assessment and giving feedback to students on their learning (p. 48)*

- *Successful engagement and demonstration of appropriate knowledge of effective assessment practices:*

The academic will need to document changes in practices that make assessment more authentic. The academic will need to provide evidence that assessment techniques not only meet the needs of the industry but also lead to the fulfilment of



course learning outcomes, threshold learning outcomes of the discipline and graduate attributes.

*Criterion 4: Developing effective environments, student support and guidance (p. 50)*

- *Initiative or innovation in supporting students and the creation of engaging learning environments:*

The academic will need to document changes in the learning environment attributed to their placement in industry, for example, creating a learning environment that mimics the environment in the workplace. Evidence in the form of improved student evaluations would be required.

*Criterion 5: Integration of scholarship, research and professional activities with teaching and in support of learning (p. 52)*

- *Industry/professional peer recognition:*

The academic should be able to demonstrate that they are able to perform as an expert while they are on placement (Department of Industry Innovation Climate Change Science Research and Tertiary Education & Department of Education Employment and Workplace Relations, 2013). Their host-supervisor would need to be recognised as a peer.

*Criterion 6: Evaluation of practice and continuing professional development (p. 54)*

- *Evidence of a sustained and successful commitment to and engagement in, continuing professional development related to academic, institutional and/or other professional practice:*

Academic WIL will be ideal for providing evidence of currency of professional practice.

## **Limitations of Academic WIL**

The following limitations of Academic WIL have been identified.

- Curriculum developments may be biased towards industry needs. While it is desirable to meet industry requirements of graduates, care must be taken to ensure that graduates also meet the graduate attributes required by the university, the threshold learning outcomes of the discipline (e.g. Phelan et al., 2015) and the Australian Qualifications Framework requirements (Australian Qualifications Framework Council, 2013).
- The curriculum may migrate to one particular host or sector of the industry.
- Poor performing teaching-research academics who feel they have been 'downgraded' to teaching-focused academics may not have the incentive to participate in an industry placement.
- Cost-centre heads who reward good teachers by giving them more teaching (Bennett et al., 2017) so that research-focused academics can "get on with the job" may not see the value of Academic WIL.
- Teaching-focused academics may enjoy their industry placement and leave academia for a career in industry.
- Casual academics may find they have a career path in industry and, as a consequence, are no longer available for teaching.

## Research questions

Two central questions guided the study:

- What are the benefits of an Academic WIL placement to the participant, the university and the host?
- What impact can an Academic WIL placement have on the quality of teaching?

## Methodology

The research approach used in this study was one of descriptive case study. According to Baxter and Jack (2008) this form of research is useful for informing professional practice and evidence-based decision making. In particular it enables researchers to describe an event or intervention in context with participants able to reflect on reality (Yin, 2009). The participants in this study included a university academic and the industry hosts. Also important in providing support for the intervention was the Head of School.

In the initial phase of the case study the concept of Academic WIL was presented to the Head of School. Support from the Head of School was critical to enable the participant to be released from normal duties for four weeks to complete the placements. At the time the request was made, the school was in the process of renewing the curriculum of three subjects which focussed on spatial literacy/analysis. The teaching team had already consulted with an industry body (North Coast Spatial Information Group) to review the learning outcomes and curriculum. In addition, the regional director of the Department of Primary Industries (DPI) had recently approached the university, informally, to explore opportunities for closer collaboration while the Byron Shire Council had recently signed a memorandum of understanding to strengthen collaboration with the university. The Head of School considered that the placements could lead to a better, more relevant curriculum and stronger collaboration with local industry.

## Participants

The host participants were contacted by email to establish whether there were any opportunities to support an Academic WIL placement. Two, two-week placements were subsequently arranged. The first was with a state government department working on a geographic information systems project to map barriers that impede fish migration (Department of Primary Industries). This DPI project had stalled due to limited resources and the DPI could see the benefit to be gained from a two-week placement. The second placement was with a local council to use geographic information systems in asset management. The council did not have a project, as such, but determined that an Academic WIL could be supervised in the asset management team. Details of the two-week placements were finalised with site visits.

The aims of the placements were to:

- Evaluate the curriculum and learning objectives.
- Identify gaps in the curriculum and learning objectives.
- Compare activities presented in practical classes with day-to-day activities while on placement.
- Improve skills using ArcGIS software.
- Help hosts achieve their outcomes.

## Data collection and analysis

Throughout the four weeks of the placement, data were collected and recorded in a structured diary which was designed to focus on the evaluation of the learning outcomes and curriculum of the three spatial subjects. The following information was collected at the end of each day.

- A summary of daily activities.
- The content needed to complete the activities, but which was not in the curriculum was identified.
- The learning outcomes required to be able to complete the tasks but which were not currently assessed in the subjects were identified.
- Each content item and learning outcome of the three subjects was evaluated.

The evaluation was based on a Likert-type scale using levels of agreement (Strongly Agree, Agree, Neutral, Disagree, Strongly disagree, Not Applicable today) to the following statement:

*The tasks completed today have led me to the conclusion that the content item/learning outcome is essential for a new graduate to attain an adequate skill level.*

At the conclusion of the placement the Head of School requested feedback from the host supervisors.

## Findings-Discussion

The academic participant reported a number of benefits from the Academic WIL placement. These included benefits to students, to the teacher, to the host and industry, and to the university.

### *Benefits to students*

The most significant benefit to the students resulted from the academic being able to bring to the classroom current practice from industry. This was achieved by incorporating experiences from the placement into lectures and tutorials and by including statements such as, *When I was working with the DPI earlier this year...* and *When you are working you will be expected to know ....*, thus validating the content being presented. Similarly being able to align assessments with current industry practice by focusing on problem solving engaged the students in authentic assessment tasks. The design of these was supported by the industry partners providing problems for students to solve. It was also possible to share with the students the particular skills in geographic information systems that will make them more employable. A few examples are listed below.

- Developing mapbooks.
- Linking Excel with the ArcGIS. Linking these software packages was a common occurrence in both placements but it was a technique considered of limited use to students.
- Georeferencing images using 'rubber sheeting' techniques.

### *Benefits to teachers*

Based on the WIL placement a number of changes to procedures in tutorial exercises were introduced to more closely align with current industry practice. A few examples are provided below.

- Working with ArcMap and ArcCatalog simultaneously. In the past the students were taught to use these modules sequentially.
- Dragging layers into the mapping area rather than opening layers manually.
- Keeping satellite imagery as the background during all editing and processing.

In addition to these specific examples, the academic participant also reported that their teaching had improved in more subtle ways. Working with the ArcGIS for a total of 20 days with experienced users able to assist with problems, had provided *in situ* learning which in

turn led to increased confidence in assisting students with a problem. The approach to problem solving became much more intuitive for the academic.

### *Benefits to the hosts and industry*

The hosts also reported benefits from the Academic WIL placement. With 25 years' experience with geographic information systems, the academic was also able to solve problems for the hosts. For example, developing a methodology for deleting duplicate records for one host and assistance in integrating raster and vector data for the other was a direct result of the placement. For one host, significant progress was made on a project that had previously stalled.

Industry, as a whole, will benefit when they employ the graduates who have been exposed to the invigorated teaching and more relevant curriculum which was a direct result of the WIL placement. They can also be confident that a student who has completed the geographic information systems unit successfully will have the skills required by employers. Furthermore, the teaching-industry nexus has continued to develop with one of the hosts. They have continued to provide problems to be solved by students studying geographic information systems this year and proposed two small research projects for honours students.

### *Benefits to the university*

The university has benefited from the Academic WIL as the participant returned to academia with more skills, more confidence in the discipline and greater commitment to and enthusiasm for changing the curriculum, assessment and learning outcomes in the relevant units of study. There has also been a strengthening in the relationship between the university and the industry partner, which in turn should have an impact on internship placements and honours projects. Furthermore, the university has received low-cost training. Training in geographic information systems is expensive with costs reported to be around \$AU800 per day (ESRI, n.d.). Training can be better targeted with Academic WIL. For example, an outcome of this Academic WIL was recognising the potential of unmanned aerial vehicles (UAVs or drones). A placement with an industry partner using drones in field work, for example, would assist in the development of the curriculum for the degree.

## **Conclusion**

There were many personal benefits from the Academic WIL placement, including being able to test knowledge and skills in the 'real world'. From the initial interviews with the host-supervisors it became clear that new techniques would be learned which would be challenging at times. The challenges served to develop much more confidence in using ArcGIS. A critical outcome overall was the opportunity to benchmark the curriculum and learning outcomes against the requirements of the industry and to develop greater confidence in the design of the curriculum. The increase in industry networks and increased opportunities for WIL placements for students have also been significant.

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